●ATENT COOPERATION TREAT● CONFIRMATION

PCT
INTERNATIONAL PRELIMINARY EXAMINATION REPORT Rec'd ...... 27 MAY 2005
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 9869SG54/GM/NSC	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).
International Application No. PCT/SG2002/000279	International Filing Date *(day/month/year)* 28 November 2002	Priority Date *(day/month/year)* 28 November 2002

International Patent Classification (IPC) or national classification and IPC

Int. Cl. [7]   G06F 17/00

Applicant

    INSTITUTE FOR INFOCOMM RESEARCH et al

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1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 3 sheets, including this cover sheet.

    [X] This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

    These annexes consist of a total of 6 sheet(s).

3. This report contains indications relating to the following items:

    I   [X] Basis of the report

    II   [ ] Priority

    III [ ] Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

    IV   [ ] Lack of unity of invention

    V   [X] Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

    VI   [ ] Certain documents cited

    VII [ ] Certain defects in the international application

    VIII [ ] Certain observations on the international application

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Date of submission of the demand 6 May 2004	Date of completion of the report 18 January 2005
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer **Michael Lander** Telephone No. (02) 6283 2494

I. Basis of the report

1. With regard to the elements of the international application:*

☐ the international application as originally filed.

☒ the description, pages **1-16,** as originally filed,

pages , filed with the demand,

pages , received on with the letter of

☒ the claims, pages , as originally filed,

pages , as amended (together with any statement) under Article 19,

pages , filed with the demand,

pages **17-22,** received on **7 December 2004** with the letter of **7 December 2004**

☒ the drawings, pages **1/6-6/6,** as originally filed,

pages , filed with the demand,

pages , received on with the letter of

☐ the sequence listing part of the description:

pages , as originally filed

pages , filed with the demand

pages , received on with the letter of

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

☐ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages

☐ the claims, Nos.

☐ the drawings, sheets/fig.

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

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* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*

** *Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report*

V.	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-30	YES
	Claims		NO
Inventive step (IS)	Claims	1-30	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-30	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

The following documents identified in the International Search Report have been considered for the purposes of this report:

US 6225546.

Novelty (N) Claims 1-30

None of the cited documents disclose all of the features of each of the independent claims. Therefore all of the claims are novel.

Inventive Step (IS) 1-30

The claimed invention is not obvious in the light of any of the cited documents nor is it disclosed in any obvious combination of them. It is also considered that it would not be obvious to a person skilled in the art in the light of common general knowledge either by itself or in combination with any of these documents.

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CLAIMS:

1. A method of summarizing digital audio data comprising the steps of:

    directly analyzing the audio data to identify a representation of the audio data having at least one calculated feature characteristic of the audio data;

    classifying the audio data on the basis of the representation into a category selected from at least two categories; and

    generating an acoustic signal representative of a summarization of the digital audio data, wherein the summarization is dependent on the selected category.

2. A method as claimed in claim 1, wherein the analyzing step further comprises segmenting audio data into segment frames, and overlapping the frames.

3. A method as claimed in claim 2, wherein the classifying step further comprises classifying the frames into a category by collecting training data from each frame and determining classification parameters by using a training calculation.

4. A method as claimed in any preceding claim, wherein the calculated feature comprises perceptual and subjective features related to music content.

5. A method as claimed in claim 3, wherein the training calculation comprises a statistical learning algorithm

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wherein the statistical learning algorithm is Hidden Markov Model, Neural Network, or Support Vector Machine.

6.   A method as claimed in any preceding claim, wherein the type of acoustic signal is music.

7.   A method as claimed in any preceding claim, wherein the type of acoustic signal is vocal music or pure music.

8.   A method as claimed in any preceding claim, wherein the calculated feature is amplitude envelope, power spectrum or mel-frequency cepstral coefficients.

9.   A method as claimed in any preceding claim, wherein the summarization is generated in terms of clustered results and heuristic rules related to pure or vocal music.

10.   A method as claimed in any preceding claim, wherein the calculated feature relates to pure or vocal music content and is linear prediction coefficients, zero crossing rates, or mel-frequency cepstral coefficients.

11.   An apparatus for summarizing digital audio data comprising:
       a feature extractor for receiving audio data and directly analyzing the audio data to identify a representation of the audio data having at least one calculated feature characteristic of the audio data;
       a classifier in communication with the feature extractor for classifying the audio data on the basis of the

representation received from the feature extractor into a
category selected from at least two categories; and

    a summarizer in communication with the classifier.
for generating an acoustic signal representative of a
summarization of the digital audio data, wherein the
summarization is dependent on the category selected by
the classifier.

12.   An apparatus as claimed in claim 11, further comprising a
segmentor in communication with the feature extractor for
receiving an audio file and segmenting audio data into
segment frames, and overlapping the frames for the
feature extractor.

13.   An apparatus as claimed in claim 12, further comprising a
classification parameter generator in communication with
the classifier, wherein the classifier classifies each of the
frames into a category by collecting training data from
each frame and determining classification parameters by
using a training calculation in the classification parameter
generator.

14.   An apparatus as claimed in any of claims 11-13, wherein
the calculated feature comprises perceptual and
subjective features related to music content.

15.   An apparatus as claimed in any of claims 11-14, wherein
the training calculation comprises a statistical learning
algorithm wherein the statistical learning algorithm is
Hidden Markov Model, Neural Network, or Support Vector
Machine.

16. An apparatus as claimed in any of claims 11-15, wherein the acoustic signal is music.

17. An apparatus as claimed in any of claims 11-16, wherein the acoustic signal is vocal music or pure music.

18. An apparatus as claimed in any of claims 11-17, wherein the calculated feature is amplitude envelope, power spectrum or mel-frequency cepstral coefficients.

19. An apparatus as claimed in any of claims 11-18, wherein the summarizer generates the summarization in terms of clustered results and heuristic rules related to pure or vocal music.

20. An apparatus as claimed in any of claims 11-19, wherein the calculated feature relates to pure or vocal music content and is linear prediction coefficients, zero crossing rates, or mel-frequency.

21. A computer program product for summarizing digital audio data comprising a computer usable medium having computer readable program code means embodied in said medium for causing the summarizing of digital audio data, said computer program product comprising:

a computer readable program code means for directly analyzing the audio data to identify a representation of the audio data having at least one calculated feature characteristic of the audio data;

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a computer readable program code for classifying
the audio data on the basis of the representation into a
category selected from at least two categories; and

a computer readable program code for generating an
acoustic signal representative of a summarization of the
digital audio data, wherein the summarization is
dependent on the selected category.

22. A computer program product as claimed in claim 21,
wherein analyzing further comprises segmenting audio
data into segment frames, and overlapping the frames.

23. A computer program product as claimed in claim 22,
wherein classifying further comprises classifying the
frames into a category by collecting training data from
each frame and determining classification parameters by
using a training calculation.

24. A computer program product as claimed in any of claims
21-23, wherein the calculated feature comprises
perceptual and subjective features related to music
content.

25. A computer program product as claimed in any of claims 21-24,
wherein the training calculation comprises a statistical
learning algorithm wherein the statistical learning
algorithm is Hidden Markov Model, Neural Network, or
Support Vector Machine.

26. A computer program product as claimed in any of claims 21-25,
wherein the acoustic signal is music.

27. A computer program product as claimed in any of claims 21-26, wherein the type of acoustic signal is vocal music or pure music.

28. A computer program product as claimed in any of claims 21-27, wherein the calculated feature is amplitude envelope, power spectrum or mel-frequency cepstral coefficients.

29. A computer program product as claimed in any of claims 21-28, wherein the summarization is generated in terms of clustered results and heuristic rules related to pure or vocal music.

30. A computer program product as claimed in any of claims 21-29, wherein the calculated feature relates to pure or vocal music content and is linear prediction coefficients, zero crossing rates, or mel-frequency.